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FARMERS' BULLETIN 413.

THE CARE OF MILK AND ITS USE IN THE HOME.

BY

GEORGE M. WHITAKER,
In Charge of Market Milk Investigations, Dairy Division, Bureau of Animal Industry,

L. A. ROGERS,
Bacteriologist in Charge of Research Laboratories, Dairy Division, Bureau of Animal Industry,

AND

CAROLINE L. HUNT,
Expert in Nutrition, Office of Experiment Stations.

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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
Washington, D. C., May 18, 1910.

SIR: We have the honor to transmit herewith, and to recommend for publication as a Farmers' Bulletin, three articles, namely: "The Care of Milk in the Home," by George M. Whitaker, in charge of market milk investigations, Dairy Division, Bureau of Animal Industry; "The Home Pasteurization of Milk," by L. A. Rogers, bacteriologist in charge of the research laboratories of the Dairy Division, Bureau of Animal Industry; and "Food Value of Milk," by Caroline L. Hunt, expert in nutrition, Office of Experiment Stations.

The material which has to do with the food values of milk was prepared under the supervision of C. F. Langworthy, expert in charge of nutrition investigations, Office of Experiment Stations.

The present bulletin is similar in scope and purpose to the popular publications which the Department has issued in the past, and summarizes available information on a subject which is of great importance to most American families.

Respectfully,

A. D. MELVIN,
Chief Bureau of Animal Industry.

A. C. TRUE,
Director Office of Experiment Stations.

Hon. JAMES WILSON,
Secretary of Agriculture.

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THE CARE OF MILK IN THE HOME.

By GEORGE M. WHITAKER,

In Charge of Market Milk Investigations, Dairy Division, Bureau of Animal Industry.

INTRODUCTION.

If the milk producer and the milk dealer have done their duty there is daily left at the consumer's door a bottle of clean, cold, unadulterated milk. By improper treatment in the home the milk may then become unfit for food, especially for babies. This bad treatment consists (1) in placing it in unclean vessels; (2) in exposing it unnecessarily to the air; (3) in failing to keep it cool up to the time of using it; and (4) in exposing it to flies.

Milk absorbs impurities—collects bacteria—whenever it is exposed to the air or placed in unclean vessels. Some of these may be the bacteria of certain contagious diseases; others may cause digestive troubles which in the case of babies may prove fatal. Much of the cholera infantum and summer bowel troubles of infants is due to impure milk. The amount of the contamination depends largely on the condition of the utensils and the air with which the milk comes in contact; the air of even a so-called clean room contains many impurities. The science of bacteriology is raising the standard of cleanliness of utensils. Bacteria which get into the milk from the air or from the vessels multiply rapidly so long as the milk remains warm; that is, at 50° F. or above. At lower temperatures the bacteria either are dormant or increase slowly. Cleanliness and cold are imperative if one would have good milk, although if it is consumed so quickly after production that the bacteria in it do not have time to increase much—say within two or three hours—the importance of cold is lessened. Milk from the grocery store or bakery which is kept in a can, open much of the time, possibly without refrigeration, is dangerous and should be avoided.

The suggestions given here regarding milk apply also to cream.

RECEIVING THE MILK.

The best way of buying milk is in bottles. Dipping milk from large cans and pouring it into customers' receptacles on the street, with all the incident exposure to dusty air not always the cleanest, is a bad practice. Drawing milk from the faucet of a retailer's can is almost as bad as dipping, because, although the milk may be exposed to the street air a little less than by the dipping process, it is not kept thoroughly mixed, and some consumers will receive less than their proportion of cream. If situated so that it is impossible to get bottled milk, do not set out overnight an uncovered vessel to collect thousands of bacteria from street dust before milk is put into it. Have the milk delivered personally to some member of the family if possible; if not, set out a bowl covered with a plate, or better still, use a glass preserving jar in which nothing but milk is put. In the latter case use a jar with a glass top, but omit the rubber band. Paper tickets are often more or less soiled; hence if they are used do not put them in the can, bowl, or jar. For the same reason money should not be put in the can.

Take the milk into the house as soon as possible after delivery, particularly in hot weather. Never allow the sun to shine for any length of time on the milk. Sometimes milk delivered as early as 4 a. m. remains out of doors until 9 or 10 o'clock. This is wrong. If it is inconvenient to receive the milk soon after it is delivered, indicate to the driver a sheltered place, or provide a covered box in which the milk bottle or can may be left.

HANDLING AND KEEPING MILK.

On receiving the milk put it in the refrigerator at once and allow it to remain there when not using from it. Except in cold weather milk can not be properly kept without ice. Unless the milk bottle is in actual contact with the ice it will be colder at the bottom of the refrigerator than in the ice compartment, as the cold air settles rapidly.

Keep milk in the original bottle till needed for immediate consumption; do not pour it into a bowl or pitcher for storage. Carefully wipe or rinse the bottle, especially the mouth, before pouring any milk from it, so that dust or dirt which may have gathered thereon or on the cap will not get into the milk. Do not pour back into the bottle milk which has been exposed to the air by being placed in other vessels. Keep the bottle covered with a paper cap as long as milk is in it and when not actually pouring from it. If the paper cap has been punctured, cover the bottle with an inverted tumbler.

Milk deteriorates by exposure to the air of pantry, kitchen, or nursery. Do not expose uncovered milk in a refrigerator containing food of any kind, not to mention strong-smelling foods like fish, cabbage, or onions. An excellent way of serving milk on the table, from the sanitary standpoint, is in the original bottle; at all events pour out only what will be consumed at one meal.

When milk is received in a bowl or pitcher instead of in a bottle, observe the spirit of the foregoing remarks: Keep the vessel covered; expose uncovered milk to the air of any room as little as possible; do not expose it at all in a refrigerator.

Remember that exposure of milk to the open air invites contamination not only from odors and bacteria-laden dust, but also from flies. These scavengers may convey germs of typhoid fever or other contagious diseases from the sick room or from excreta to the milk. Records show typhoid epidemics from such a cause, and 100,000 fecal bacteria have been found on a single fly. Flies also frequently convey to milk large numbers of the bacteria that cause intestinal disorders in infants; an examination of 414 flies showed an average of 1,250,000 bacteria per fly.

THE REFRIGERATOR.

Keep the refrigerator clean and sweet. Personally inspect it at least once a week. See that the outlet for water formed by the melting ice is kept open and that the space under the ice rack is clean. The place where food is kept should be scalded every week; a single drop of spilled milk or a small particle of other neglected food will contaminate a refrigerator in a few days.

CLEANING EMPTY BOTTLES AND UTENSILS.

As soon as a milk bottle is empty rinse it in lukewarm water until it appears clear, then set it bottom up to drain. Do not use it for any other purpose than for milk. There is no objection to the consumer's washing and scalding the milk bottle, but this is unnecessary, as the dealer will wash it again when it reaches his plant. He can not, however, do this properly if he receives the bottle in a filthy condition, and if you return such a bottle your negligence may result in the subsequent delivery of contaminated milk to some consumer, possibly yourself.

All utensils with which milk comes in contact should be rinsed, washed, and scalded every time they are used. Use fresh water; do not wash them in dishwater which has been used for washing other utensils or wipe them with an ordinary dish towel—it is better to boil in clean water and set them away unwiped.

When a baby is bottle-fed, every time the feeding bottle and nipple are used they should be rinsed in lukewarm water, washed in hot water, to which a small amount of washing soda has been added, and then scalded. Never use a rubber tube between bottle and nipple, or a bottle with corners.

CONTAGIOUS DISEASE.

If a case of typhoid fever, scarlet fever, diphtheria, or other contagious disease breaks out in the family, do not return any bottles to the milkman except with the knowledge of the attending physician and under conditions prescribed by him.

PASTEURIZATION.

While efficient pasteurization destroys disease germs and affords a safeguard against certain dangers, it should not be regarded as an insurance against future contamination of milk, and the foregoing suggestions should be observed in the case of pasteurized milk as well as with ordinary milk. Do not keep milk over twenty-four hours, even if it seems to be sweet, as milk may become unfit for human food before it sours.

THE HOME PASTEURIZATION OF MILK.

By L. A. Rogers,

Bacteriologist, Dairy Division, Bureau of Animal Industry.

INTRODUCTION.

Milk delivered in the cities in the summer months frequently contains bacteria in such large numbers that it is not a safe food for children, especially for infants whose food consists entirely of milk. In many cities a special milk can be secured, but this is sometimes difficult and always involves additional expense. When it is impossible to obtain milk entirely free from suspicion it is advisable to pasteurize the milk, especially if it is to be consumed by small children.

The pasteurization should be done in such a way that disease-producing bacteria as well as those likely to produce intestinal disturbances are destroyed without at the same time injuring the flavor or the nutritive value of the milk. This may be accomplished in the home by the use of a simple improvised outfit.

METHOD OF PASTEURIZATION.

Milk is most conveniently pasteurized in the bottles in which it is delivered. To do this use a small pail with a perforated false bottom. An inverted pie tin with a few holes punched in it will answer this purpose. This will raise the bottles from the bottom of the pail, thus allowing a free circulation of water and preventing bumping of the bottles. Punch a hole through the cap of one of the bottles and insert a thermometer. The ordinary floating type of thermometer is likely to be inaccurate, and if possible a good thermometer with the scale etched on the glass should be used. Set the bottles of milk in the pail and fill the pail with water nearly to the level of the milk. Put the pail on the stove or over a gas flame and heat it until the thermometer in the milk shows not less than 150° nor more than 155° F. The bottles should then be removed from the water and allowed to stand from twenty to thirty minutes. The temperature will fall slowly, but may be held more uniformly by covering the bottles with a towel. The punctured cap should be replaced with a new one, or the bottle should be covered with an inverted cup.

After the milk has been held as directed it should be cooled as quickly and as much as possible by setting in water. To avoid

danger of breaking the bottle by too sudden change of temperature, this water should be warm at first. Replace the warm water slowly with cold water. After cooling, milk should in all cases be held at the lowest available temperature.

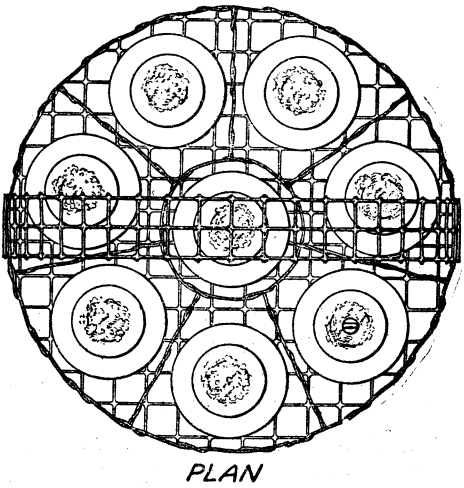

FIG. 1.—Wire basket holding bottles for pasteurization of milk.

This method may be employed to retard the souring of milk or cream for ordinary uses. It should be remembered, however, that pasteurization does not destroy all bacteria in milk, and after pasteurization it should be kept cold and in a cleanly manner and used as soon as possible. Cream does not rise as rapidly or separate as completely in pasteurized milk as in raw milk.

When milk is to be used for infants the pasteurization should be done in the nursing bottle to avoid the possibilities of contamination and the necessity of warming the entire lot of milk each time a feeding is taken. This will require, on account of the smaller bottles, a slightly different method than for ordinary bottles. A bottle should be provided for each feeding with the exact amount of milk required. An extra bottle should also be provided, as there is always the possibility that a bottle will be broken in the process. If the milk is modified, this should be done before pasteurization. Bottles not provided with seals may be plugged with ordinary (not absorbent) cotton and the thermometer held in one of the bottles by the cotton plug. A wire or tin basket to hold the bottles upright in the water is very con-

venient. Such a device is shown in figure 1. Place the bottles in the pail of water and heat until the thermometer shows that the temperature of the milk is 145° to 150° F. Then remove the bottles, change the thermometer from the milk to the water, and add cold water until the temperature of the water is also 145° to 150° F. Put the bottles back in the water and cover with a bath towel or other suitable cloth. Hold in this way at least 20 minutes, and then cool by running water into the pail. When the milk is cooled to the temperature of the tap water it is an excellent plan to pack broken ice about the bottles and hold them in the refrigerator in this way.

The milk should not be removed until immediately before it is used, and if bottles are warmed and not used they should be discarded.

FOOD VALUE OF MILK.

By CAROLINE L. HUNT,

Expert in Nutrition, Office of Experiment Stations.

INTRODUCTION.

It is a commonplace saying that milk, or to be more specific, cow's milk, is a perfect food. This may be taken to mean that it contains, first, materials which children need for growth; second, materials which young and old alike need for the repair of their bodily machinery; and, third, materials which both need for fuel, i. e., to provide them with heat and with the energy necessary for work. It should not be understood, however, to mean that it has these ingredients in such proportions that it can serve satisfactorily as an exclusive food for a grown person or even for a child. Though it is the best substitute for mother's milk, it must be "modified" more or less before it can be used even for infant feeding with good results.

It is likewise a commonplace saying that milk is a cheap as well as a nutritious food. Just at present with prices of all kinds of foods rapidly changing it is not so easy as it once was to make the comparisons that are necessary to show which particular foods are really cheap, but while the prices of food materials vary the composition of most of them remains unchanged, and it is always possible to compare their nutritive values. A quart of milk supplies practically as much of both protein and energy as three-quarters of a pound of beef of average composition or eight average eggs, and can generally be bought for less money. In case milk is 8 cents a quart, beef 20 cents a pound, and eggs 24 cents a dozen, 10 cents spent for milk will buy a little more protein and much more energy than 10 cents spent for beef or 10 cents spent for eggs. Thus, while other animal foods than milk (meat, eggs, and cheese) are desirable to give variety to the diet it may be assumed that milk may be used as an economical substitute for any one of them.

Of the vegetable foods, many (flour, for example) are found to be much cheaper than milk when both price and nutritive value are taken into consideration, and as a matter of fact they always form the greater part of the bulk of human food; but of the animal foods which are usually combined with the vegetable foods, milk is one of the cheapest.

In spite of the fact that milk is recognized as a nutritious and a cheap food, there seems to be a general tendency to think of it not as a possible substitute for other more expensive foods, but rather as an addition to the bill of fare. To illustrate, milk is frequently used as a beverage without the reduction of the amount of meat or other proteid foods served. From the point of view of the need of the body this may be considered extravagant and the serving of a glass of milk or of a bowlful of soup or of such desserts as custards and baked milk, or the use of generous quantities of milk or white sauce on vegetables offers an opportunity to cut down the allowance of meats and eggs.

THE COMPOSITION OF MILK.

The tendency to think of milk as a beverage rather than as an important source of food comes partly, no doubt, from the fact that it is a liquid rather than a solid and that most liquid foods, such as clear soup, coffee, and tea, contain very little that feeds the body. It is natural, therefore, to associate milk with these rather than with the really nourishing food materials. In order to overcome this tendency it is well to study the solid products of milk as they are obtained by various processes familiar in the dairy and in the kitchen as well as in the laboratory. Before doing this it may be helpful to get an idea of the classes into which the solids contained in milk are divided. These are: (1) Proteids, (2) fats, (3) sugar, and (4) mineral matter. The fat and sugar serve as fuel, and the mineral matter is chiefly valuable for the making of bones and teeth and other physiological purposes. The proteids serve as fuel like the fats and sugar, but they are used also to make and to repair the muscular tissues of the body. This double usefulness indicates why proteids are so often referred to as the most important part of milk.

Fat constitutes about 4 per cent of the weight of milk. All are familiar with the common process of butter making by which the greater part of the fat is separated from the other ingredients. The liquid which remains and which is called buttermilk contains the rest of the nutrients of the milk except the small portions which cling to the fat. On examining buttermilk after it has become a little sour, it may be seen that it contains a white solid which in the process of churning has been divided into very small particles. This solid is casein, the chief proteid of the milk. It constitutes 3.3 per cent, or about one-thirtieth, of the weight of the milk.

The familiar process of the souring of milk also helps to an understanding of its composition. When this takes place the casein and most of the fat separate from the whey and form what is known as the curd. When, however, the attempt is made to separate the

curd completely for the purpose of making cottage cheese, much of the fat is usually carried off with the whey. This is particularly true if the curd is strained while warm. It may therefore be in place here to suggest that after sour milk has been scalded for the purpose of making cottage cheese it is well to chill it thoroughly before straining. Through very common processes, those of butter and cheese making, one may become familiar with the solid known as casein and with the fat of milk. But the clear whey which may be separated from the curd also has important solids in it and with these one seldom has a chance to become acquainted. The following simple experiment may be carried out with the ordinary dishes in use in the kitchen:

Separate a portion of whey from the curd of sour milk, and, if necessary to make it perfectly clear, strain through a piece of fine cloth without previously heating. Examine to see that there are no solid particles in it. Divide into two parts. Heat one part to the boiling point, and when cool pour into a glass, examine, and compare with the unheated portion. The part that has been heated will be seen to be full of small particles of a white solid which soon sink to the bottom of the liquid. This is albumen, a substance always present in cow's milk, though in very much smaller amount than the casein. It resembles the albumen of the white of an egg. It differs from the casein in not curding when the milk sours and in remaining in solution in the whey. Furthermore, it does not form curd in the stomach. This experiment is particularly important to those who wish to understand milk in its relation to the feeding of babies. The proteid which by the process of heating is shown to be present in the whey is the chief proteid of human milk, while in cows' milk, as has been said, it is found in very much smaller amount than the curding proteid. Cows' milk, therefore, can never be a perfect equivalent for human milk in infant feeding, even if diluted and modified, though it may be the best available substitute for it. It is easy to understand that a baby may be able to digest a proteid which remains dissolved in the whey more easily than one which curds soon after reaching the stomach.

To continue the experiment with milk, strain the whey which has been heated and again get a clear liquid. Pour this into a double boiler over water and heat until it is dry. There will be left a solid sugary mass. Place some of this in an old spoon or on a piece of tin or sheet iron and burn. Notice the characteristic odor of charred sugar. Milk contains 5 per cent of sugar. This sugar is not exactly like the sugar used on the table. It is much less sweet and physiologists and chemists find that it acts differently from ordinary sugar during the process of digestion. For this reason the sugar used in

preparing a baby's food should never be granulated sugar, but milk sugar, which can be bought at the druggist's.

If it is possible to get the spoon in which the sugar is heated sufficiently hot to burn the sugar completely, it will be discovered that there remains behind a small portion of white powder, which the most intense heat does not consume. This is the mineral matter of the milk. It constitutes about seven-tenths of 1 per cent of its weight, and it is more abundant in comparison with other nutrients than in any other common food. It is easy, of course, to see why this material which builds the bone should be in the food primarily designed for the use of young animals.

Thus by simple and interesting processes, fat, casein, albumen, sugar, and minerals may be separated and milk may be shown to be a mixture of many valuable solids either suspended or dissolved in water. Such experimenting shows, too, why it is that no other liquid is regarded as a true substitute for milk in the feeding of young children. No attempt will be made in this bulletin to give exact directions for the modification of milk for feeding babies, because this varies with individual cases and is a matter which should be regulated by the physician or other person with expert knowledge. Many valuable books give such directions for children of various ages and such books may prove very helpful to the mother and the nurse. A careful consideration, however, of the facts that have been given here about the different solids in milk should make it possible for a person to follow the directions for modifying milk more intelligently and to understand better the reasons for the varying proportions given in the formulas for infant feeding.

ECONOMICAL USE OF MILK.

In order to make plain what is meant by the statement which occurs above, that it is very often economical to serve milk in place of other foods, but extravagant to add it to a meal which from the point of view of nourishment is already adequate, the following menu is given, which may be called a "milkless" bill of fare, as no milk is supplied, except in so far as it enters into the composition of the cake or other dishes:

Breakfast.—Oranges, eggs on toast, coffee with cream.
Luncheon.—Cold lamb, potato salad, tea, bread and butter, preserves, and plain cake.
Dinner.—Sirloin steak, potatoes, asparagus, bread and butter, strawberry shortcake.

The nourishment in such a bill of fare, which has been selected not because it is any more desirable than a thousand others which might have been chosen, but merely to give something to discuss, would of course depend on the size of the portions served. For the purpose of

giving some idea of how large the portions should be, let us imagine that the family being served consists of a man, a woman, a boy of 15, and a girl of 12. It is quite generally agreed that this family would usually eat and would, in fact, need about 3.3 as much food as one man would need. Without going into all the figures, it may be considered that such a family would get enough nourishment from the above bill of fare, if the amounts of foods used per day were 2 pounds of meat, 1½ pounds of flour, ¾ pound of butter (or of butter and other fats, oil, or drippings), 1 pint of cream, 6 eggs, ¾ pound of sugar, 4 oranges, 2 pounds of potatoes, 1 bunch of asparagus, 1 box of berries, and 1 pint of canned fruit. These materials would supply the required fuel and would give 11½ ounces of proteids, the amount usually considered to be needed each day by the family of the size given above. The cost of food materials, in case meat is 20 cents a pound, butter 40 cents, eggs 24 cents a dozen, coffee 35 cents a pound, cream 20 cents a pint, oranges 30 cents a dozen, potatoes $1 a bushel, asparagus 15 cents a bunch, and strawberries 15 cents a box, would be not far from $1.60.

If milk were taken as a beverage in addition to the other materials in this bill of fare, every quart so used would increase the proteids unnecessarily by more than an ounce. When it is considered that the entire allowance for the 4 people per day is only 11½ ounces, it will be seen that this addition is quite significant. The addition of a quart of milk would raise the cost of the food by 8 or 9 cents. A glass of milk taken as a beverage at each meal by every person, amounting to 3 quarts per day, would add 3½ ounces of proteids to the daily diet and 27 cents to the cost of the food materials for the entire family.

But if, instead of adding the milk to the other foods, it were substituted for some of them, and 3 quarts of milk were purchased instead of half a pint of cream, it could either be used as a beverage or it would supply one-half pint of cream for tea and coffee, 1 pint of half milk and half cream for use on cereals or puddings, and 2¼ quarts of skimmed milk for cooking. A bill of fare which would utilize this milk is as follows:

Breakfast.—Oranges, oatmeal with half milk and half cream, coffee with cream.
Luncheon.—Eggs on toast, lettuce, bread and butter, tea, old-fashioned rice pudding (1 quart of milk, ¼ cup sugar, ¼ cup of rice, flavoring).
Dinner.—Cream of tomato soup, sirloin steak, creamed potatoes, strawberry shortcake.

So far as the nutritive value is concerned, the milk with the addition of the small amounts of oatmeal and the rice contained in this bill of fare would take the place of the cream, part of the potatoes, 1 pound of meat, the preserves, and the cake of the first bill of fare. Using the same sort of data with respect to food prices, the computed

cost of the second bill of fare would be about 23 cents less than that of the first.

The above is one specific example taken merely for purposes of illustration of the way in which milk may be substituted for other foods. In general, in making this substitution, the fact given on another page that a quart of milk is equal in nutritive value to three-fourths of a pound of beef or 8 eggs should be kept in mind. Or, to give the equivalent in smaller amounts, a cup of milk is equal to 3 ounces of lean beef or 2 eggs in total nourishment.

FOOD VALUE OF SKIM MILK.

It is natural to ask if skim milk is as valuable a food as whole milk. In answering this question several points must be taken into consideration, some of which have been touched upon in the first part of the bulletin. Freshness and cleanliness must be considered as well as composition. Milk which has been received from the milkman and allowed to stand long enough to skim should probably never be given to children under 2 years of age. For older people the mere fact of its being old need not be taken into consideration. If skim milk is bought as such, however, it should always be thoroughly cooked, unless it is known to have been handled carefully and to be clean. So far as its nutritive value is concerned it has a trifle more protein, volume for volume, than whole milk, the per cent being 3.4 instead of 3.3.

Skim milk seems to some people rather thin for use as a beverage, but others value it for this very quality. If it is allowed to stand until it sours and is then churned or beaten until the curd is broken up into small particles, it makes a familiar and wholesome drink, often used under the name of buttermilk, for much of the commercial buttermilk is thus made from skim milk, some cream or butter fat being sometimes added. For cooking, the lack of fat and any consequent lack of flavor can be easily made up, as butter or less expensive fats can be used with it. Pork and bacon fat make a particularly savory addition.

In the very interesting experiment of serving penny luncheons to anemic children in the Boston schools, one of the combinations of food that it was found possible to sell for the low price of 1 cent was skimmed milk and bread and butter. In an experiment, made in Birmingham, England, where an effort was made to serve food economically to underfed children, cocoa made with skimmed milk was served.

The following suggest ways in which milk may be used in the diet applied to skim as well as whole milk.

MILK SOUPS.

A large variety of soups may be made the means of utilizing not only milk, but also left-over portions of vegetables and other foods. In making them allow from one-half to 1 level tablespoonful of flour to each cup of liquid (including milk and the juice and pulp of vegetables) and 1 level tablespoon or more of butter or other fat. Some of the flavorings which may be used are: Onions, corn, asparagus, cabbage, cauliflower, peas, beans, tomatoes, salmon or other fish, celery, spinach, or grated cheese.

MILK CHOWDER.

Chowders are also a very acceptable means of serving milk. In making rich chowders the proportions used are: Two cups of milk or of milk and water, 1 cup of potatoes cut into small pieces, and 1 pound of fish. The flavoring is onions and fat tried from salt pork. While these proportions make a rich dish, it is possible to reduce the amount of fish greatly, to leave it out entirely, to use small portions of left-over fish or some salt codfish which has been freshened, or to substitute corn for it. Such dishes are palatable and of reasonably high nutritive value providing the greater part of the liquid used is milk.

MILK GRAVIES.

A great variety of milk gravies, thickened with flour and enriched with butter or other fat, may be served with potatoes or other vegetables or poured over toast. The proportions are 2 level tablespoonfuls of flour and 2 level tablespoonfuls of butter to 1 cup of milk. To this may be added chipped beef, codfish or other fresh or salt fish, hard-boiled eggs, small portions of chicken or veal or grated cheese. Milk gravy flavored with cheese makes a good and very nutritious sauce to pour over cauliflower and cabbage or to serve with boiled rice or hominy.

A very good way to serve milk toast is to toast bread very thoroughly and to pour hot milk over it at the time of serving. In serving milk toast in this way all the dishes should be kept very hot. A heavy earthenware pitcher may be used for serving the hot milk, as it retains heat for a long time.

Sour milk is used to a large extent in cookery and the sour milk itself, or more commonly the sour-milk curd, is considered by many persons a palatable and wholesome dish. Sour cream is also used in many ways in the household in the making of sauces and dressings and in cookery.

COTTAGE CHEESE.

Perhaps the most common name in the United States for the freshly separated skim-milk curd is cottage cheese, though other names, for instance, schmierkase, are also well known.

Cottage cheese contains all the proteids of milk and part of the fat. It is made either by heating the curd slightly and straining or by straining it without heating. If any heat is used, it should be very gentle or the curd will become hard and unpalatable. A safe way of heating is to pour boiling water into the curd. This is a good way also for those who do not care for the taste of lactic acid, for the hot water serves to remove part of this.

Cottage cheese would probably be a more popular dish if it were served in a greater variety of ways. For many palates it needs to be enriched with a little butter or cream. The French variety, to which reference was made, is commonly served with sugar and cream, and a similar dish is eaten in the United States, often being seasoned with a little ground cinnamon or nutmeg.

Cottage cheese is always a good addition to or accompaniment of salads. A good luncheon which can be served in one course consists of cottage cheese in which the first portions are eaten with dressed lettuce or water cress, and the last portion with a little of some rather sweet fruit preserve, such as strawberry or raspberry jam or preserved quinces. Served with bread and butter and tea this makes a well-balanced meal.

Cottage cheese flavored in different ways may be used for sandwiches. In busy households it may be well to prepare the filling and to allow the various members of the family to make their own sandwiches at the table. Caraway seeds, chopped stuffed olives of different sorts, and chives (a vegetable which may be easily grown in the kitchen window as well as the kitchen garden) make good flavors. Instead of the different kinds of stuffed olives, plain olives and pimentos may be chopped separately and added, but this requires more work.

The question is likely to arise why sour milk and its products are considered safe food to be eaten raw, while stale sweet milk is looked upon with some suspicion unless it has been cooked. The reason is that for a long time after the milk is drawn all the bacteria which enter into it increase in number, the increase being more or less rapid, depending chiefly on the temperature at which the milk is kept. Some of these bacteria may be kinds that produce disease. Finally, however, when milk sours the harmless lactic-acid bacteria and the lactic acid which they produce tend to destroy other microorganisms, including the disease-producing bacteria, so that the time comes when the harmful bacteria decrease very rapidly and the lactic-acid bacteria increase very rapidly. By the time the milk is sour it is practically free from bacteria, except those of the lactic-acid type.

SWEET CURDS.

Sweet curds may be made into a good filling for pies or tarts. The curd is obtained by adding rennet to warm milk and allowing the milk to stand until it hardens. The curd is then broken up and strained. To the curd from 1 quart of milk add 1 level tablespoonful of butter, one-quarter of a cup of sugar, the yolks of 2 eggs, and a few Zante currants or chopped raisins, and a little nutmeg. In earlier times, the sweet curd from cheese making was much used as a food, but is not common to-day, though sometimes served where it can be readily obtained from a cheese factory. Whey was also much used in earlier times and is still a favorite beverage with many and employed especially in invalid dietetics.

MILK DESSERTS.

Junket served very cold is a refreshing dessert in hot weather, as are the numerous milk sherbets, frozen custards, and similar desserts in which milk is used. Baked milk, made by cooking sweetened and flavored milk for a long time in a slow oven, is also good. Many different kinds of puddings are made by baking milk with cereals and either molasses or sugar. The cereal may be rice, corn meal, or buttered white or whole-wheat bread. In this class of food belongs, so far as nourishment is concerned, the scalloped potatoes made by cooking sliced raw potatoes for a long time in a large amount of milk.

BUTTERMILK.

As a wholesome and nutritious food buttermilk is also valuable. It has 3 per cent of proteids, and a quart contains one-fourth as much proteid as a man needs in a day, even if the most liberal estimate of his needs is taken. It is said to possess hygienic value as well, the theory being that lactic-acid bacteria may grow in the intestines, crowding out other and undesirable kinds.

Though not much different in nutritive value, buttermilk obtained as a by-product in butter making has a different quality or texture and a different flavor from so-called skim-milk buttermilk referred to above.

SUMMARY.

Milk and milk products are wholesome and economical foods, which may readily be used in quantity in the diet.

Quality and cleanliness in handling are important topics which must be considered, as well as food value.

A few examples have been given of the use of milk, skim milk, milk curd, and buttermilk in the home. Others will readily suggest themselves to the housewife.